

Posterior segment anatomy

The posterior segment comprises the remaining internal structures which lie posterior to the anterior segment. Note that this excludes the *ciliary body* which is considered to be part of the anterior segment. Seems obvious but you'd be surprised how many medical students trip over that — at least once. ☹

Vitreous (hyaloid) body

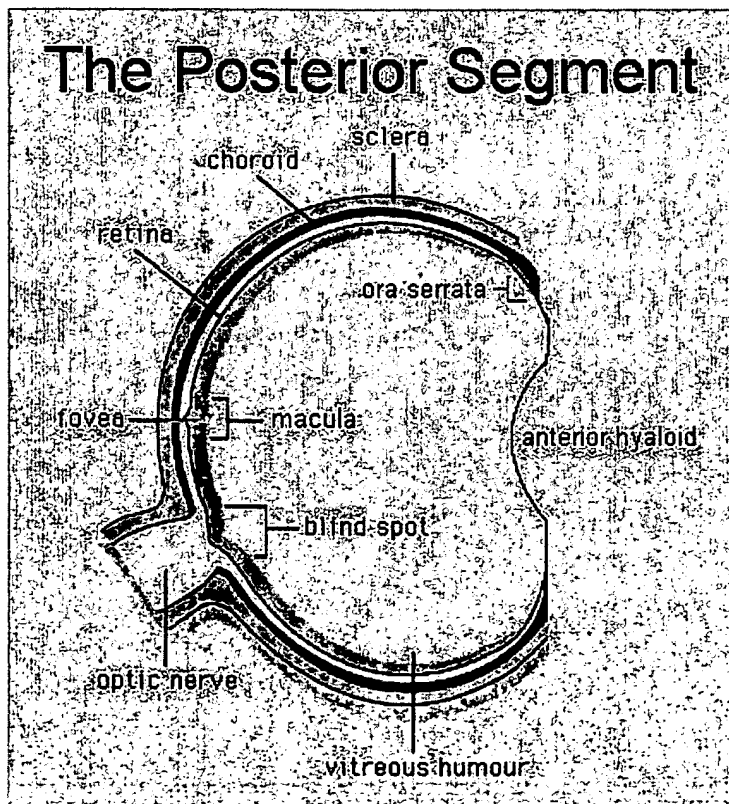


Figure 1. The posterior segment (adapted from Encyclopedia Britannica with permission.)

Behind the potential space of the posterior chamber is a larger cavity called the vitreous chamber. The vitreous chamber is not a hollow space. It is filled, in the young eye, with a gel-structure called the *vitreous body*, or *hyaloid*. The water clear vitreous body has also been called the *vitreous humor* or the *vitreous gel*. However, it is neither a humor nor a gel. It is instead a microfibrillar net-like structure whose interstices are filled with a very thick, gel-like substance containing mucopolysaccharides and hyaluronate acids. The function the hyaloid serves is to maintain the

shape of the eye keeping the retina pressed against the inner surface of the eye. It also serves to cushion the contents of the eye from shocks such as from running or turning of the head.

In cross section, the vitreous body appears as an almost doughnut-like structure with a potential tube-like space extending from the anterior hyaloid face to the posterior hyaloid just anterior to the macula. The vitreous body is encased in a clear hyaloid membrane akin to the outer membrane seen in the white of an egg. And, as in the egg white, can sometimes have strands which will show up as "floaters".

With advancing age the gel liquefies, forming pockets of aqueous fluid. The collagen fibrils tend to be coalesce into thick strands as the process continues. Eventually, if they become large enough and lie in the visual axis, they can be seen as grayish *floaters*. These floaters may disappear only to reappear over days, months, or years. As the process continues, the floaters tend to fall below the visual axis or line of vision. Rapid eye movement, however, may cause them to reappear as the motion of the thinner fluid causes them to swirl around. This tends to happen especially in the morning upon awakening and getting out of bed.

Associated with the degeneration of the vitreous and as it becomes more mobile within the back of the eye, are sometimes seen *lightning flashes* — bright flashes of light seen in the peripheral vision. This occurs due to the movement of the hyaloid face across the nerve fiber layer. By itself this *entopic light phenomenon* is harmless. However, if it is associated by a curtain partially or completely blocking vision, is a serious association with a retinal detachment. This danger is sufficiently serious that all individuals first experiencing such lightning phenomenon associated with floaters (or 'blackbirds') should seek consultation with an ophthalmologist.

Retina

Between the vitreous and the scleral coat of the eye — covering most of the back surface — is a thin layer of nervous tissue — an extension of the optic nerve — called the *retina*. The retina has ten layers and is responsible for gathering light focused upon it by the cornea and lens. It converts the light to electrical signals which it amplifies and sends on to the brain for interpretation and construction of images. It is thus the brain that does the seeing — not the eye itself.



The retina is divided into two general zones or areas. The central part, the part that receives the most sharply formed

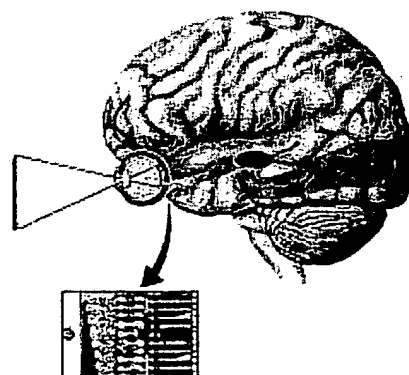


Figure 2. the visual pathway
(click to enlarge retinal section)

Figure 3. The 'fundus'
(click to enlarge)

images, is called the *macular area* and is slightly elevated except at its' very center where it is quite thin and looks like a dimple. The macular area is responsible for daylight and color vision and contains specialized cells for that purpose. The very center of the macula — the *fovea* — is where best vision occurs. The rest of the retina is called the peripheral part

and provides side vision, does most of the seeing at night and also detects motion. The sum total of the extent of the vision — both central and peripheral — is called the *visual field* (VF). We will have more to say about VF's in the **glaucoma section**.

Choroid

The retina lies on a black membrane (another anti-halation coating — the back layer of the iris is the other) which in turn overlies a very leaky collection of blood vessels called — the *choroid*. The bog-like choroid supplies the inner retinal sensory cells with nutrients and oxygen while the retinal arteries and veins, coming in from the center of the optic nerve and overlying the retina, supply the rest. The movement of nutrients into the sensory cells is done by active transfer across cell membranes; that's why vision deteriorates when the retina is detached and no longer in contact with the choroid.

Optic nerve

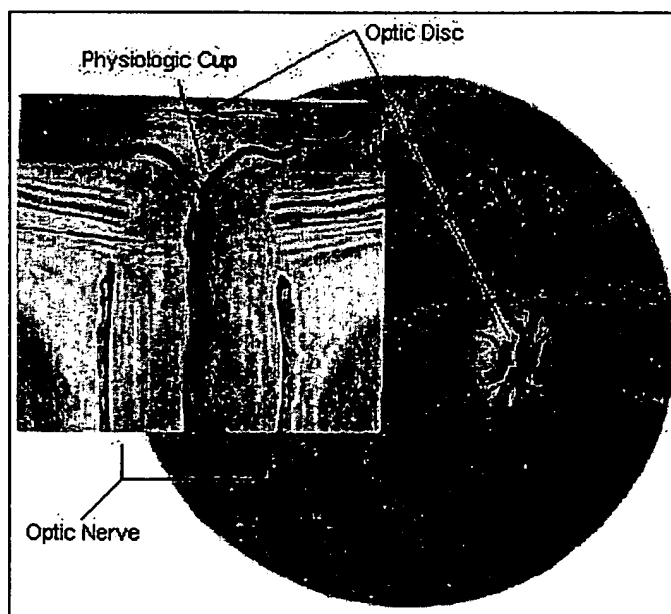


Figure 4. cross section of optic nerve

The optic nerve conveys the visual receptor axons and other nerve fibers to the brain. It is covered by a very tough, flexible extension of the sclera as far as the *optic chiasm*. The central artery and vein (which supply the internal layers of the retina) run up the center of this nerve and emerge from a natural central cleft in the nerve head which is sometimes more than a potential opening and which is called the *physiological cup* or just *cup*. We have more to say on the significance of this cup in the **glaucoma section**.



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Last modified: 08/23/2002 11:29:04